

# Lesson Plans



# MOSS

McCALL OUTDOOR SCIENCE SCHOOL

University of Idaho

College of Natural Resources



**Title:** Creative Data Visualization

**Grade Level:** 5<sup>th</sup>-8<sup>th</sup> grade

<b>Topic:</b>	<b>Utilizing Data</b>
<b>Background:</b>	Introduce students to fun and exciting ways to visualize data outside of just graphs and tables. Emphasize that graphs and charts are essential for understanding relationships and trends in data. A challenge for scientists is to effectively communicate important scientific discoveries to the public. Sometimes, even when scientists find interesting relationships in their research, the public may never know the importance of their work because the data is not displayed in a way that is understandable or engaging. In order for science to be integrated into public policy, the arts, history, media, etc., it is important that scientists communicate their data in a way that non-scientists can understand.
<b>Next Generation Standards:</b>	<b>ETS2A</b>
<b>Goals:</b>	Through this activity, students will gain awareness of the ways that scientific data is expressed all around them from commercials, to posters, maps, songs, and infographics in magazines. Students will become more comfortable with recognizing important relationships within their data. Students will gain experience in communicating scientific data creatively so that audiences outside of their science class will even be interested. This activity also incorporates teambuilding, communication, and presentation experience.
<b>Objectives:</b>	<ul style="list-style-type: none"> <li>• Students will utilize data to be represented in many different visual forms</li> </ul>
<b>Materials:</b>	<ul style="list-style-type: none"> <li>○ PowerPoint presentation with examples of different data visualizations including infographics, 3-D sculptures, geospatial relationships, musical references, etc. You can use the prepared slide show that it linked to the Educator Resources Lesson Plans webpage and add additional data visualizations that you find or you can make your own. You can also ask the students to bring in an example of a data visualization that they find (videos, magazines, commercials, newspaper, NPR stories, etc).</li> <li>○ Craft materials for students to use to build, draw, act, construct data visualizations, limited only by</li> </ul>

	<p>your imagination!</p> <ul style="list-style-type: none"> <li>○ Some materials we use at MOSS:             <ul style="list-style-type: none"> <li>▪ Legos</li> <li>▪ Costume box</li> <li>▪ Markers</li> <li>▪ Construction paper</li> <li>▪ Cardboard</li> <li>▪ Pipe cleaners</li> <li>▪ Crayons</li> <li>▪ Clay/playdough</li> <li>▪ Natural materials                 <ul style="list-style-type: none"> <li>• Rocks, leaves, pine needles, etc.</li> </ul> </li> </ul> </li> </ul>
<b>Set up:</b>	Create a PowerPoint presentation as described in materials. Gather materials listed.
<b>Classroom Time:</b>	2 45 minute periods
<b>Introduction (Engage):</b>	<p>Start by explaining to the students that they will be working with the data that they have collected from a previous inquiry based study. Open the PowerPoint. Slide 1: Engage the students by asking the following types of questions:</p> <ul style="list-style-type: none"> <li>• What types of data have you gathered so far?</li> <li>• Of all the things that you have collected, what do you think is the most interesting information in your field notebook?</li> <li>• In what ways can you show those meaningful relationships from your data?</li> <li>• If you were to present your data, how would you show your audience?</li> </ul> <p>Slide 2: Before you go to this slide, ask the students the different ways they know to display their data (tables, charts, line graphs, scatterplots, bar graphs, pie charts, etc)</p> <ul style="list-style-type: none"> <li>• You can talk about how those types of displays are how scientists, (which includes the students!) often show their data to their audiences, especially in scientific reports or presentations.</li> <li>• You can open up a hypothetical discussion by asking the students if they think their “non-scientist” friends from the history or art class nearby (who have not had any experience</li> </ul>

	<p>collecting water data) would be interested in graphs and charts of their data.</p> <ul style="list-style-type: none"> <li>• Talk about how scientists, media, and organizations often show their data in other ways. You can ask students “who considers themselves a scientist this week? But who else considers himself or herself an artist? A sculptor? An actor? A designer? Explain that scientists can also have more than one interest! And their experiments can become more interesting when they include those other talents in the way that they show their data.</li> </ul>
<p><b>Activity (Explore):</b></p>	<p>Explore the next few slides of infographics, videos, maps, drawings, etc. Give the students a minute or two to look at each visualization to figure out what the display represents. After everyone gets a chance to view the display, open up a class discussion so that students can explain what relationship the visualization is trying to drive home. You can also have them share where their eyes were first drawn to and what they think is the most interesting/effective part of the visualization. Emphasize that traditional graphs and charts are incredibly important for a scientist to figure out the significant relationships within their data, and that it’s important part of science, but that once the scientist gets to the “Reflect and Share” part of the scientific method, they can develop other ways to show others their data.</p>
<p><b>Explanation &amp; Elaborate</b></p>	<p>Once the students have seen lots of different types of visualizations, explain their task. Split the class into groups of 3-4 (If you are working with field groups, split each field group into two mini-groups so that everyone stays on task).</p> <p>Give them the following instructions.</p> <p>Challenge: Create a data visualization that you could show to your friends outside of this class who have no knowledge of your research project. Your visualization should engage your friends so that they are interested, but should also be clear so that they can understand what your data means and why your finding is important. Emphasize the importance of labeling and putting the data into context of the bigger picture.</p>



	<p>STEP 1: 10 minutes</p> <ul style="list-style-type: none"> <li>• As a group, look through your field notebook.</li> <li>• Find your most interesting/meaningful data (it might be helpful to sketch out a graph that explores the relationship)</li> <li>• Check out the materials that you can use</li> <li>• BRAINSTORM a creative, fun, and interesting way to present that information to the class.</li> <li>• Sketch out a design, jot down the main ideas for a skit or song</li> <li>• Run your project idea by your instructor to get permission to begin using materials.</li> <li>• Be sure that your visualization shows clearly whatever you think is most meaningful or interesting about your data!</li> </ul> <p>STEP 2: 20-30minutes</p> <ul style="list-style-type: none"> <li>• CREATE!</li> <li>• Practice presentation</li> </ul> <p>STEP 3: 15 minutes</p> <ul style="list-style-type: none"> <li>• Present!</li> </ul> <p>Set clear expectations with the students, reminding them that they must stay on task or you will cut down the time they have to finish their projects.</p> <p>As you check over students project “proposals”, be sure that they students are clearly representing their data. Ask you walk around and check on the student’s projects, encourage them to use labels if necessary so that their data is accurately represented.</p>
<p><b>Evaluation:</b></p>	<p>Once all the groups are ready to present, ask the students to put all the unused materials away and clear up their area. It might be helpful to put all the visualizations in the front of the room so that the groups are not fidgeting with them as other groups are presenting. Before the presentations begin, encourage students to observe each presentation and come up with questions about the data as well as comments on the delivery of the data through the visualization. After each presentation, the class should be able to answer what the data visualization displayed, why the relationship is important, and what they think is the most effective/interesting part of the visualization. Through the presentations, you can assess if the students understand the relationships within their data, how</p>

	<p>creatively they can show their data, and how well the class can understand the different ways that students present their data. This is also a good teamwork, communication, and presentation skills activity. At the end of the presentations, you can extend the activity by asking each student to bring in and present an example of data visualization for homework. They can use the internet, magazines, YouTube, or explain a data visualization they saw on a commercial or heard on the radio.</p>
	<ul style="list-style-type: none"><li>•</li></ul>

**Additional resources:**

<http://www.nytimes.com/interactive/2011/04/28/us/tornado-deaths.html>